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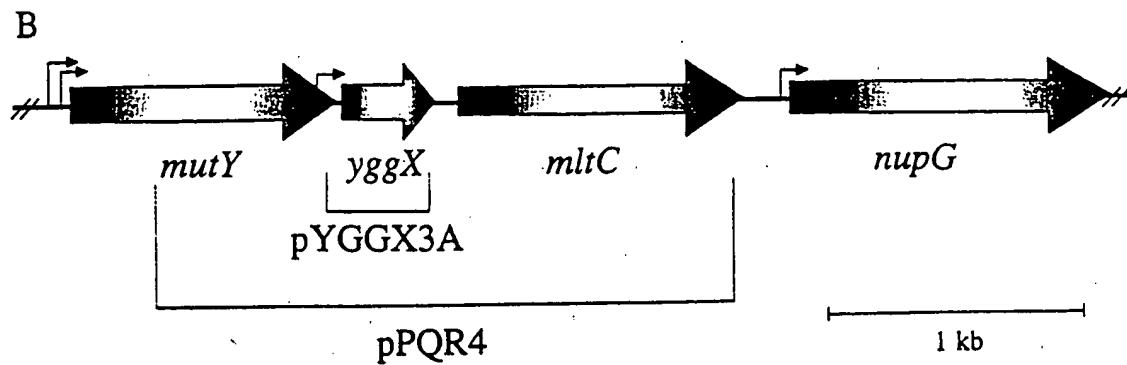


Fig. 1. Physical parameters of *yggX* and its gene product. (A) Alignment of *YggX* homologs. (B) Operon structure of *mutY/yggX* in *E. coli* and *S. enterica* LT2. Promoters were mapped by Gifford and Wallace in *E. coli* (43).

Bpertussis  
Bparapert  
Bbronchi  
A.actin  
Pmultocida  
Hinfluenzae  
Hducreyi  
Sputrefasciens  
Vcholerae  
Ecoli  
O157\_H7EDL933  
O157\_H7  
Spara  
Senteritidis  
Sdublin  
StyphiCT18  
Styphimurium  
Kpneumo  
Ypesits  
Buchnera  
Xfastidiosa  
Psyring  
Pputida  
Paeruginosa  
Ngonorrhoeae  
NmeningitB  
NmeningitA  
Bmallei  
Bpseudomallei  
Tferrooxidans  
Mcapsulatus  
Cburnetti

1 MSRIIVNCVLKREAEGLDFPPYPGELGTRIWOQISKEAWEWKOIQTRLVNENRNLADA  
1 MSRIIVNCVLKREAEGLDFPPYPGELGTRIWOQISKEAWEWKOIQTRLVNENRNLADA  
1 MSRIIVNCVLKREAEGLDFPPYPGELGTRIWOQISKEAWEWKOIQTRLVNENRNLADA  
1 MARMVFCERLKQEAEGLDFQLYPGELGKRIFDSISKQAWGEWMKKQTMLVNEKKLNMMNA  
1 MARTVFCYLKQESEGLDFQLYPGELGKRIFDSISKQAWREWMKKQTMLVNEKKLNMMNA  
1 MARTVFCYLKKEAEGLDFQLYPGELGKRIFDSVSKQAWGEWIKKQTMLVNEKKLNMMNA  
1 MARMVFCYLKKEAEGLDFQLYPGELGKRIFNSISKQAWAEWIKKQTMLVNEKKLNMMNP  
1 MARTVNCVHLNKEADGLDFQLYPGDLGKRIFDNIISKEAWGLWQKKQTMLVNEKKLNMMNV  
1 MARTVFCCTRLQKEADGLDFQLYPGELGKRIFDNIISKEAWAQWOTKQTMLVNEKKLNMMMDP  
1 MSRTIIFCTFLQREAEGQDFQLYPGELGKRIFYNEISKEAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTFLQREAEGQDFQLYPGELGKRIFYNEISKEAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTFLQREAEGQDFQLYPGELGKRIFYNEISKEAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTYLRDAEAEQDFQLYPGELGKRIFYNEISKDAWAQWQHKQTMLVNEKKLNMMNA  
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1 MSRTIIFCTYLRDAEAEQDFQLYPGELGKRIFYNEISKDAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTYLRDAEAEQDFQLYPGELGKRIFYNEISKDAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTYLRDAEAEQDFQLYPGELGKRIFYNEISKDAWAQWQHKQTMLVNEKKLNMMNA  
1 MSRTIIFCTFLQREADQDFQLYPGELGKRIFYNEISKEAWAQWQHKQTMLVNEKKLNMMNP  
1 MSRTIIFCTFLKKDAERQDFQLYPGEIGKRIYNEISKEAWSQWITKQTMLVNEKKLNMMNI  
1 MNRIIIFCTFFKKKSEGQDFQSYSPGKLGKKIYDQISKKAWEKWIEKOTILINEENLNMFNL  
1 MORIIIFCEYEQRDTEGLDFVPYPGELGQKIFACIGKVWAAWLVHOTMLVNENRSLPRNP  
1 MTRTVMCRKYKEELPGLERAPYPGAKGEDIFNHVSQKAWADWQKHOTLILINERRLNMMNA  
1 MTRTVMCRKYQEELPGLERAPYPGAKGQDIFEHISQKAWADWQKHOTMLVNEKRNLMMNA  
1 MSRTVMCRKYHEELPGLDRPPYPGAKGEDIYNNVSRKAWDEWQKHOTMLVNEERRLNMMNA  
1 MARMVFCVVLNKEAEKGKFPPLPNELGKRIFENVSQEAWAAWTRHOTMLVNENRSLADP  
1 MARMVFCVVLNKEAEKGKFPPLPNELGKRIFENVSQEAWAAWTRHOTMLVNENRSLADP  
1 MARMIIHCAKLGKEAEGLDFPPLPGEGLGKRILYESVSKQAWQDWLKCQTMLVNENRNLADP  
1 MARMIIHCAKLGKEAEGLDFPPLPGEGLGKRILYESVSKQAWQDWLKCQTMLVNENRNLADP  
1 MSRMVOCVVLGHEAEGLDRPPYPGALGARIYQEVSKAWEWQGWLKHOTMLVNEYRLSPIDP  
1 MARRIIICAKLGIEADGLDAPPFGPGQGQRIFEHVSKEAWQDWLKLQTMLVNEHRUTPFEA  
1 MTRRIIICQKLGEADALNYSPPGELGERIYNHISEQAWQAWLSHOTMLVNEYRSLIDP

Fig. 1A

Bpertussis	61 RARKYILOQQOMERFLFEDGTVEAQGYVP-----
Bparapert	61 RARKYILOQQOMERFLFEDGTVEAQGYVP-----
Bbronchi	61 RARKYILOQQOMERFLFEDGTVEAQGVPE-----
A.actin	61 EHRKLLEQEMVNELFEGKDVKHIEGYTPPEAK
Pmultocida	61 DHRQLLEQEMVNELFEGKDVKHIEGYVP-----
Hinfluenzae	61 EHRKLLEQEMVNELFEGKDVKHIEGYVP-----
Hducreyi	61 EHRQLLEAEMVNELFEGKDVKHIDGYVP-----
Sputrefasciens	61 DDRKFLEAQMTSELFEKGKDVEIEGFVPE-----
Vcholerae	61 EHRKLLEQEMVNELFEGKEVHIEGYTPPAK-----
Ecoli	61 EHRKLLEQEMVNELFEGKEVHIEGYTPEDKK-----
O157_H7EDL933	61 EHRKLLEQEMVNELFEGKEVHIEGYTPEDKK-----
O157_H7	61 EHRKLLEQEMVNELFEGKEVHIEGYTPEDKK-----
Spara	61 EHRKLLEQEMVSFLFEGKDVKHIEGYTPEDKK-----
Senteritidis	61 EHRKLLEQEMVSFLFEGKDVKHIEGYTPEDKK-----
Sdublin	61 EHRKLLEQEMVSFLFEGKDVKHIEGYTPEDKK-----
StyphiCT18	61 EHRKLLEQEMVSFLFEGKDVKHIEGYTPEDKK-----
Styphimurium	61 EHRKLLEQEMVSFLFEGKDVKHIEGYTPEDKK-----
Kpneumo	61 EHRKLLEQEMVQFLFEGK-----
Ypesits	61 EDRKLLEQEMVNELFEGQDVHIAGYTPPSK-----
Buchnera	61 EHRKKIEKYMKLFLFK-----
Xfastidiosa	61 SHRAFLEEEELNKFLFERRVAKPEGYIEPD-----
Psyring	61 EDRKFLQTEMDKELSGEEYQAEGYVPPEK-----
Pputida	61 EDRKFLQAEMDKSFAGEEYQAEGYVP-----
Paeruginosa	61 EDRKFLQQEMDKELSGEDYAKADGYVP-----
Ngonorrhoeae	61 RAREYLAQOMEQYFFGDQADAVQGYVPQ-----
NmeningitB	61 RAREYLAQOMEQYFFGDQADAVQGYVPQ-----
NmeningitA	61 RAREYLAQOMEQYFFGDQADAVQGYVPQ-----
Bmallei	61 RAROYLMKOTEKYYFFGEGADQASGYVP-----
Bpseudomallei	61 RAROYLMKOTEKYYFFGEGADQASGYVP-----
Tferrooxidans	61 KSRTFLEKQMEAAYFFGDGAQSPEGYVP-----
Mcapsulatus	61 SARKFLEQEREKELFGGGTSTPQGYVP-----
Cburnetti	61 KARQFLEQEMINELFGTGSEKPGAGYTS-----

Fig. 1A (continued)

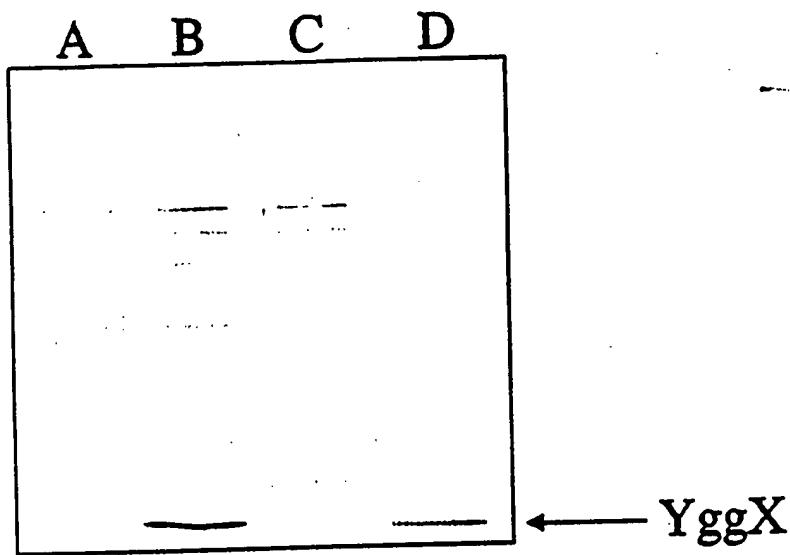


Fig. 2. Increased levels of YggX protein in *yggX\** mutant. Western blot analysis was performed according to Harlow and Lane (59). Proteins were visualized by using alkaline phosphatase conjugated to anti-rabbit secondary antibody (Promega). Lanes A-C were loaded with crude cell-free extracts (1  $\mu$ g protein) from strains DM5104, DM5105 (*yggX\**), and DM5647 (*yggX::Gm*), respectively. Lane D was loaded with 1 ng purified YggX.

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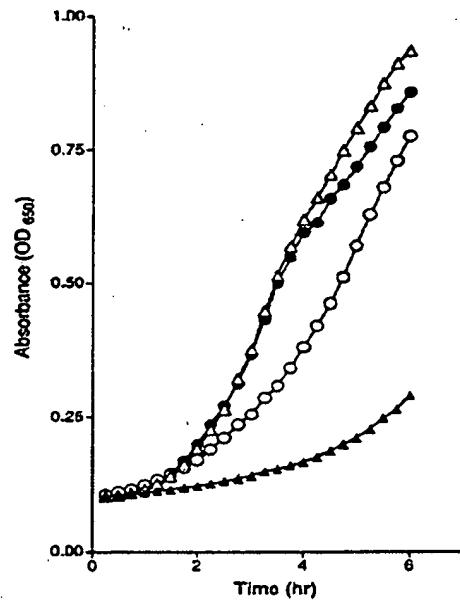


Fig. 3. The *yggX\** mutation does not increase MNNG resistance of *gshA* mutants. Strain LT2 was grown in LB with (▲) and without (△) 60  $\mu$ M MNNG. Both *gshA* (○) and *gshA yggX\** (●) mutant strains were grown in LB with 60  $\mu$ M MNNG.

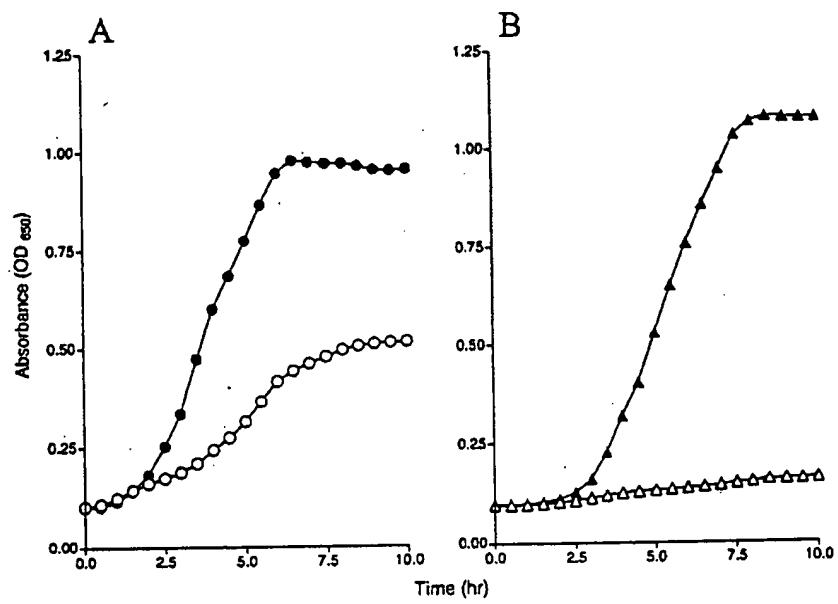


Fig. 4. The *yggX\** mutation increases resistance of *S. enterica* to PQ. (A) Growth of *gshA* (○) and *gshA yggX\** (●) mutant strains in LB with 4  $\mu$ M PQ. (B) Growth of LT2 ( $\Delta$ ) and *yggX\** ( $\blacktriangle$ ) strains in LB with 40  $\mu$ M PQ.

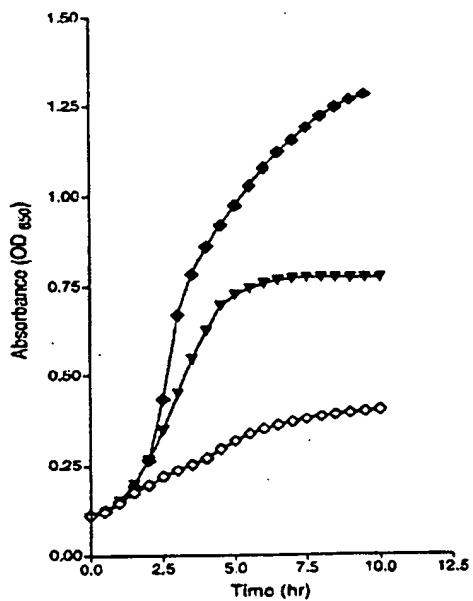
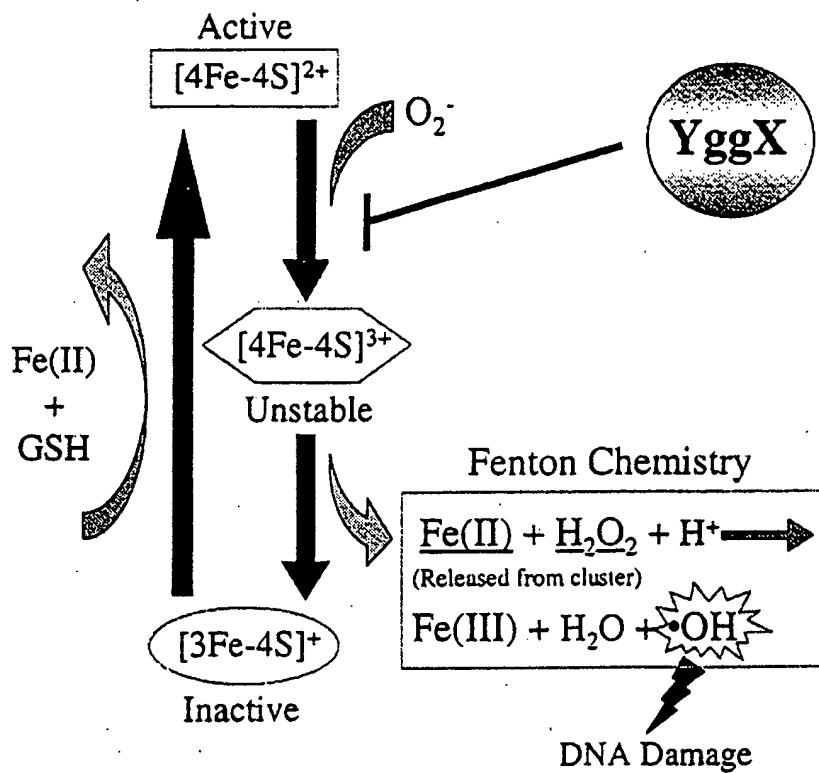


Fig. 5. *yggX\** does not require *soxR* to mediate resistance to PQ. Strains LT2 (◆), *soxR* (◇), and *soxR yggX\** (▼) were grown in LB with 4.0  $\mu$ M PQ.



**Fig. 6.** Model showing how YggX protects *S. enterica* from oxidative damage. The result of superoxide attack on [Fe-S] clusters is depicted. We hypothesize that YggX is able to block oxidative damage to labile clusters and thus prevent the normal downstream consequences of such oxidation.